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An unending variety of topics

Thursday, August 24, 2006

Colliding galaxy clusters show dark matter

Astronomers have now observed dark matter separate itself out from normal matter. Normally dark matter and ordinary matter are too well mixed to observe separately. However, when galaxy clusters collide at high velocity (the cloud observed here was produced by a 4,700 kilometer per second collision) ordinary and dark matter can become separated.

In this research, the position of hot gas (ordinary matter) in a vast odd cloud resulting from such a collision was measured with an x-ray telescope. The center of gravity of the combined ordinary and dark matter was observed by measuring its gravitational lensing effect on bright galaxies behind the cloud with an optical telescope. The difference between the two positions showed that the dark matter (which normally outweighs ordinary matter 6 to 1) had become separated from the ordinary matter.

The leading explanation for the separation is that the dark matter doesn't experience drag from electromagnetic forces -- it only reacts to gravity -- and thus doesn't get as perturbed from a collision as ordinary matter.

The image above shows dark matter positioned as indicated by gravitional lensing (blue) painted onto the optical image. This video shows a simulation of galaxy clusters made out of dark matter (blue) and ordinary matter (red) colliding and producing such a cloud. More here.

Astronomer Sean Carroll says this research "proves beyond a reasonable doubt" that dark matter exists. I love it when scientists talk my language. :-)

Posted by Nick Szabo at 1:55 PM

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Nick Szabo

"A premier thinker about history, law and economics, and the lessons they have for security." -- Adam Shostack, Emergent Chaos

"Szabo comes out with these essays that leave me in awe." -- Brian Dunbar

"Reading material that is eclectic, challenging and endlessly fascinating." -- Sean McGrath, Propylon

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